



SEQUENCE LISTING

<110> Neeper, Michael P.
McClements, William L.
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Schultz, Loren D.
Chen, Ling
Wang, Xin-Min

<120> SYNTHETIC HUMAN PAPILLOMAVIRUS GENES

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<141> 2000-08-21

<150> PCT/US00/22932

<151> 2000-08-21

<150> 60/210,143

<151> 2000-06-07

<150> 60/150,728

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tgcgacagca	ccctgcgcct	gtgcgtgcag	agcaccacag	tggacatccg	caccttgag	240
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<211> 297

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<223> Codon-Optimized HPV6a E7

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gacggccagg	acagccagcc	cctgaagcag	cacttccaga	tcgtgacctg	ctgctgcggc	180
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 <223> Codon-Optimized HPV16 E1 fragment
 <400> 33
 atggccgacc ccgccggcac caacggcgag gagggcaccg gctgcaacgg ctggttctac 60
 gtggaggccg tggtagagaa gaagaccggc gacgccatca gcgacgacga gaacgagAAC 120
 gacagcgac 129
 <210> 34
 <211> 132
 <212> DNA
 <213> Artificial Sequence
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 <223> Codon-Optimized HPV16 E1 fragment
 <400> 34
 gtgctgcttg gcctcctggg cggatgaacag ggcgtgggag gtctcggtct cggcctgggt 60
 caggtagtcg ttgtcgttca cgatgaagtc caccaggtcc tcgccggtgt cgctgtcgtt 120

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ctcgtttctcg tc 132

<210> 35
<211> 132
<212> DNA
<213> Artificial Sequence

<220>
<223> Codon-Optimized HPV16 E1 fragment

<400> 35
gccaggagg ccaagcagca ccgcgacgcc gtgcagggtgc tgaagcgcaa gtacctgggc 60
agcccccctga gcgacatcag cggctgcgtc gacaacaaca tcagcccccg cctgaaggcc 120
atctgcatcg ag 132

<210> 36
<211> 131
<212> DNA
<213> Artificial Sequence

<220>
<223> Codon-Optimized HPV16 E1 fragment

<400> 36
ctcgtggcgg ccctccacct gcagcatctg ctgggtctcc acctcgggtg tgccgtagcc 60
gctgtcctcg ctctcgaaca ggcggcgctt ggcggcgagg ctctgcttct cgatgcagat 120
ggccttcagg c 131

<210> 37
<211> 132
<212> DNA
<213> Artificial Sequence

<220>
<223> Codon-Optimized HPV16 E1 fragment

<400> 37
caggtggagg gccgccacga gaccgagacc ccctgcagcc agtacagcgg cggcagcggc 60
ggcggctgca gccagtacag cagcggcagc ggcggcgagg gcgtgagcga ggcacacacc 120
atctgccaga cc 132

<210> 38
<211> 135
<212> DNA
<213> Artificial Sequence

<220>
<223> Codon-Optimized HPV16 E1 fragment

<400> 38
cttgaagggg cgcaccagct cgctgaagct cagcggctac agtccttga acttggccag 60
catggcgggc ttggcggtgc tggctctcag caggttcagg atgttggtca gaggggtctg 120
gcagatggtg tggcg 135

<210> 39
<211> 135
<212> DNA
<213> Artificial Sequence

<220>
<223> Codon-Optimized HPV16 E1 fragment

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<220>
 <223> Codon-Optimized HPV16 E1 fragment

<400> 44
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 gtacttgatc cactggctca tgctcatctg cttcttctcg gcgcgcttgt agtggcggca 120
 catggtggc 129

<210> 45
 <211> 129
 <212> DNA
 <213> Artificial Sequence

<220>
 <223> Codon-Optimized HPV16 E1 fragment

<400> 45
 cagatcgtga tgttcctgcg ctaccagggc gtggaattca tgagcttcct gaccgccctg 60
 aagcgcttcc tgcagggcat cccaagaag aactgcatcc tgctgtacgg cgccgccaac 120
 accgacaag 129

<210> 46
 <211> 130
 <212> DNA
 <213> Artificial Sequence

<220>
 <223> Codon-Optimized HPV16 E1 fragment

<400> 46
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 gatcacgctg cctgcagga acttcatcag gctcatgccg aacaggctct tgctcggtgtt 120
 ggcggcgccg 130

<210> 47
 <211> 129
 <212> DNA
 <213> Artificial Sequence

<220>
 <223> Codon-Optimized HPV16 E1 fragment

<400> 47
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 gacgacaacc tgcgcaacgc cctggacggc aacctggtga gcatggacgt gaagcaccgc 120
 ccctggtg 129

<210> 48
 <211> 132
 <212> DNA
 <213> Artificial Sequence

<220>
 <223> Codon-Optimized HPV16 E1 fragment

<400> 48
 gaactcggtg gggaagggtga acaccaccag gcggttgctg aggtagggcc agcggctgtc 60
 ggtgccggcg ttgatgttgc tggatgacag caggggaggg cacttcagct gcaccagggg 120
 gcggtgcttc ac 132

<210> 49
 <211> 126

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<212> DNA
<213> Artificial Sequence

<220>
<223> Codon-Optimized HPV16 E1 fragment

<400> 49
gtgttcacct tccccaacga gttcccttc gacgagaacg gtaaccccggt gtacgagctg      60
aacgacaaga actggaagag cttcttcagc cgcacctgga gccgcctgag cctgcacgag      120
gacgag                                         126

<210> 50
<211> 105
<212> DNA
<213> Artificial Sequence

<220>
<223> Codon-Optimized HPV16 E1 fragment

<400> 50
catgagagat ctttacaggg tgttggtggt ctggccgctc acgcacttga aggtgggcag      60
gctgtcgccg tcgttctcct tgtcctcgtc ctcgtcgagg ctacag                      105

<210> 51
<211> 23
<212> DNA
<213> Artificial Sequence

<220>
<223> Codon-Optimized HPV16 E1 fragment

<400> 51
gcctgaaggc catctgcacg gag                                         23

<210> 52
<211> 23
<212> DNA
<213> Artificial Sequence

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<223> Codon-Optimized HPV16 E1 fragment

<400> 52
ctcgatgcag atggccttca ggc                                         23

<210> 53
<211> 21
<212> DNA
<213> Artificial Sequence

<220>
<223> Codon-Optimized HPV16 E1 fragment

<400> 53
gagctgggtgc gcccttcaa g                                         21

<210> 54
<211> 21
<212> DNA
<213> Artificial Sequence

<220>

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<400> 54
cttgaagggg cgcaccagct c
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<220>
<223> Codon-Optimized HPV16 E1 fragment

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<210> 56
<211> 21
<212> DNA
<213> Artificial Sequence
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<400> 56
catggggctc acgcacagca g
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<220>
<223> Codon-Optimized HPV16 E1 fragment

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<210> 58
<211> 21
<212> DNA
<213> Artificial Sequence
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<400> 58
gtagtggcgg cacatggtgg c
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<220>
<223> Codon-Optimized HPV16 E1 fragment

$$\begin{array}{ll} \langle 210 \rangle & 60 \\ \langle 211 \rangle & 21 \end{array}$$

[illegible]

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<212> DNA
<213> Artificial Sequence

<220>
<223> Codon-Optimized HPV16 E1 fragment

<400> 60
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21

<210> 61
<211> 24
<212> DNA
<213> Artificial Sequence

<220>
<223> Codon-Optimized HPV16 E1 fragment

<400> 61
gtgttcacct tccccaacga gttc
24

<210> 62
<211> 24
<212> DNA
<213> Artificial Sequence

<220>
<223> Codon-Optimized HPV16 E1 fragment

<400> 62
gaactcgttg gggaagggtga acac
24

<210> 63
<211> 25
<212> DNA
<213> Artificial Sequence

<220>
<223> Codon-Optimized HPV16 E1 fragment

<400> 63
catgagagat ctttacaggg tgttg
25

<210> 64
<211> 38
<212> DNA
<213> Artificial Sequence

<220>
<223> Codon-Optimized HPV16 E1 fragment

<400> 64
catctcagat ctgccaccat ggccgacccc gccggcac
38

<210> 65
<211> 99
<212> DNA
<213> Artificial Sequence

<220>
<223> Codon-Optimized HPV16 E2 fragment

<400> 65

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atggagaccc tgtgccagcg cctgaacgtg tgccaggaca agatcctgac ccactacgag 60
aacgacagca ccgacctgcg cgaccacatc gactactgg 99

<210> 66
<211> 104
<212> DNA
<213> Artificial Sequence

<220>
<223> Codon-Optimized HPV16 E2 fragment

<400> 66
ccaccagggtg gtgcccaccc tggccgtgag caagaacaag gccctgcagg ccgccgagct 60
gcagctgacc ctggagacga tctacaacag ccagtacagc aacg 104

<210> 67
<211> 108
<212> DNA
<213> Artificial Sequence

<220>
<223> Codon-Optimized HPV16 E2 fragment

<400> 67
ccggctgcat caagaagcac ggctacaccg tggaggtgca gttcgacggc gacatctgca 60
acaccatgca ctacaccaac tggacccaca ttacatctg tgaggagg 108

<210> 68
<211> 104
<212> DNA
<213> Artificial Sequence

<220>
<223> Codon-Optimized HPV16 E2 fragment

<400> 68
cgtgcacgag gggatccgca cctacttcgt gcagttcaag gacgacgccg agaagtacag 60
caagaacaag gtgtgggagg tgcacgccgg aggccagggtg atcc 104

<210> 69
<211> 110
<212> DNA
<213> Artificial Sequence

<220>
<223> Codon-Optimized HPV16 E2 fragment

<400> 69
ggccaaccac agcgccgcca cccacaccaa ggccgtggcc ctgggcaccg aggagaccca 60
gaccacaatc cagcgccctc gcagcgagcc cgacaccggc aaccctgcc 110

<210> 70
<211> 107
<212> DNA
<213> Artificial Sequence

<220>
<223> Codon-Optimized HPV16 E2 fragment

<400> 70
gccacaaggy ccggatcaac tgcaacagca acaccacccc tatcgtgcac ctgaagggcg 60
acgccaacac cctgaagtgc ctgcggtacc gttcaagaa gactgc 107


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<210> 71
<211> 113
<212> DNA
<213> Artificial Sequence

<220>
<223> Codon-Optimized HPV16 E2 fragment

<400> 71
ccagggtggg caccacctgg tggttgatgt gcttgaagcc catctcgcg gccttgtagt    60
agatggcgca ggccaggcgc atgtgcttcc agtagtcgat gtggtcgcgc agg          113

<210> 72
<211> 101
<212> DNA
<213> Artificial Sequence

<220>
<223> Codon-Optimized HPV16 E2 fragment

<400> 72
gccgtgcttc ttgatgcagc cggtaggggc ggtcaggtac acctccaggc tcacgtcctg    60
cagggtccac ttctcgttgc tgtactggct gttgtagatc g                    101

<210> 73
<211> 98
<212> DNA
<213> Artificial Sequence

<220>
<223> Codon-Optimized HPV16 E2 fragment

<400> 73
ggtgcggatc ccctcgtgca cgtagtacag gccgtagtag tccacctggc cctccaccac    60
ggtcacgctg gcctcctcac agatgtaaat gtgggtcc                        98

<210> 74
<211> 110
<212> DNA
<213> Artificial Sequence

<220>
<223> Codon-Optimized HPV16 E2 fragment

<400> 74
gggtggcggc gctgtggttg gccaggtgct ggcgatcgt ctcggggctg ctcacctcgt    60
tgctgctgaa cacgctggtg gggcacagga tcacctggcc tccggcgtgc          110

<210> 75
<211> 111
<212> DNA
<213> Artificial Sequence

<220>
<223> Codon-Optimized HPV16 E2 fragment

<400> 75
gcagttgatc cgcccttgt ggctgctgtt gaaggcggtc aggatagggg cgctgtcgac    60
gctgtcgcgg tgcagcagct tgggtggtgt gcaggggttg ccggtgtcgg g          111

<210> 76

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<211> 110
<212> DNA
<213> Artificial Sequence

<220>
<223> Codon-Optimized HPV16 E2 fragment

<400> 76
cgtaggtcag ggtcacgata gcgctcttgt gcttcacgtt gtggccggtc cagtgccagg      60
tgctgctcac ggcggtgtac agcttgacgt gcttcttgaa gcggtaccgc                    110

<210> 77
<211> 111
<212> DNA
<213> Artificial Sequence

<220>
<223> Codon-Optimized HPV16 E2 fragment

<400> 77
tttagatgct catgaagccg gtgctcacgg tgatggtctt ggggatcttc acctggctca      60
ggaactggtc gcgctgccac tcgctgtcgt aggtcagggt cacgatagcg c                    111

<210> 78
<211> 50
<212> DNA
<213> Artificial Sequence

<220>
<223> Codon-Optimized HPV16 E2 fragment

<400> 78
cgagctgata tcgaattcag atctgccacc atggagaccc tgtgccagcg                    50

<210> 79
<211> 45
<212> DNA
<213> Artificial Sequence

<220>
<223> Codon-Optimized HPV16 E2 fragment

<400> 79
ggttgcagat ctagactcga gtttagatgc tcatgaagcc ggtgc                        45

<210> 80
<211> 21
<212> DNA
<213> Artificial Sequence

<220>
<223> Codon-Optimized HPV16 E2 fragment

<400> 80
ccggctgcat caagaagcac g                                                  21

<210> 81
<211> 19
<212> DNA
<213> Artificial Sequence

<220>

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<223> Codon-Optimized HPV16 E2 fragment

<400> 81
ggccaaccac agcgccgcc 19

<210> 82
<211> 21
<212> DNA
<213> Artificial Sequence

<220>
<223> Codon-Optimized HPV16 E2 fragment

<400> 82
gccgtgcttc ttgatgcagc c 21

<210> 83
<211> 17
<212> DNA
<213> Artificial Sequence

<220>
<223> Codon-Optimized HPV16 E2 fragment

<400> 83
gggtggcggc gctgtgg 17

<210> 84
<211> 22
<212> DNA
<213> Artificial Sequence

<220>
<223> Codon-Optimized HPV16 E2 fragment

<400> 84
cgtaggtcag ggtcacgata gc 22

<210> 85
<211> 109
<212> DNA
<213> Artificial Sequence

<220>
<223> Codon-Optimized HPV16 E7 fragment

<400> 85
ggccggagat ctgatatcga attcgccacc atgcacggcg acacccccac cctgcacgag 60
tacatgctgg acctgcagcc cgagaccacc gacctgtacg gctacggcc 109

<210> 86
<211> 106
<212> DNA
<213> Artificial Sequence

<220>
<223> Codon-Optimized HPV16 E7 fragment

<400> 86
gccgagcccg accgcgccca ctacaacatc gtgaccttct gctgcaagtg cgacagcacc 60
ctgcgcctgt gcgtgcagag caccacgctc gacatccgca ccctgg 106

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<210> 87
<211> 96
<212> DNA
<213> Artificial Sequence

<220>
<223> Codon-Optimized HPV16 E7 fragment

<400> 87
gggcgcggtc gggctcggcc tggccggcgg gcccgtcgat ctgctcctct tcctcgctgc      60
tgtcgttcag ctggccgtag ccgtacaggt cgggtg                                     96

<210> 88
<211> 106
<212> DNA
<213> Artificial Sequence

<220>
<223> Codon-Optimized HPV16 E7 fragment

<400> 88
ccgcggcaga tctagactcg agtttagggc ttctggctgc agattgggca caccgattccc      60
agggtgcccc tcagcaggtc ctccagggtg cggatgtcga cgtggg                                     106

<210> 89
<211> 25
<212> DNA
<213> Artificial Sequence

<220>
<223> Codon-Optimized HPV16 E7 fragment

<400> 89
ggccggagat ctgatatcga attcg                                             25

<210> 90
<211> 20
<212> DNA
<213> Artificial Sequence

<220>
<223> Codon-Optimized HPV16 E7 fragment

<400> 90
ccgcggcaga tctagactcg                                             20

<210> 91
<211> 105
<212> DNA
<213> Artificial Sequence

<220>
<223> Codon-Optimized HPV6a E7 fragment

<400> 91
gtcacagatc tgatatcgaa ttccaccatg caccggccgc acgtgaccct gaaggacatc      60
gtgctggacc tgcagcctcc cgaccccggtg ggcctgcact gctac                                     105

<210> 92
<211> 105
<212> DNA
<213> Artificial Sequence

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60
105

60
107

60
102

24

26

<400> 97
 gtcacagatc tgatatcgaa ttccaccatg cacggcccca aggccaccct gcaggacatc 60
 gtgctgcacc tggagcccca gaacgagatc cccgtggacc tgctgtgcc 109

 <210> 98
 <211> 111
 <212> DNA
 <213> Artificial Sequence

 <220>
 <223> Codon-Optimized HPV18 E7 fragment

 <400> 98
 gggctcggcc ctgcgagcgg gcaggtgctg gtggttcacg ccgtcgatct cgctgttctc 60
 ctctcgtctg tcgctcagct gctcgtggca cagcaggtcc acggggatct c 111

 <210> 99
 <211> 108
 <212> DNA
 <213> Artificial Sequence

 <220>
 <223> Codon-Optimized HPV18 E7 fragment

 <400> 99
 gccgcctcgc agggccgagc cccagcgcca caccatgctg tgcattgtgct gcaagtgcga 60
 ggcccgcatc gagctggtgg tggagagcag cgctgacgac ctgcgcgc 108

 <210> 100
 <211> 109
 <212> DNA
 <213> Artificial Sequence

 <220>
 <223> Codon-Optimized HPV18 E7 fragment

 <400> 100
 cagtcagatc tagagatata ttactgctg gctggcgcac cagggggcaca cgaagctcag 60
 ggtgttcagg aacagctgct ggaaggcgcg caggtcgtca gcgctgctc 109

 <210> 101
 <211> 26
 <212> DNA
 <213> Artificial Sequence

 <220>
 <223> PCR Fragment

 <400> 101
 gtcacagatc tgatatcgaa ttccac 26

 <210> 102
 <211> 27
 <212> DNA
 <213> Artificial Sequence

 <220>
 <223> PCR Fragment

 <400> 102
 cagtcagatc tagagatata ttactg 27

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<210> 103
<211> 90
<212> DNA
<213> Artificial Sequence

<220>
<223> Codon-Optimized HPV6 E2 fragment

<400> 103
gaattcagat ctgatatcac catggaggcc atcgccaagc gcctggacgc ctgccaggag      60
cagctgctgg agctgtacga ggagaacagc                                         90

<210> 104
<211> 92
<212> DNA
<213> Artificial Sequence

<220>
<223> Codon-Optimized HPV6 E2 fragment

<400> 104
ccttgtacag cagcacgctc tcgtggcgca tgcacttcca gtgcagcacg tgcttgtgca      60
ggtcgtgctt gttctcctcg tacagctcca gc                                         92

<210> 105
<211> 96
<212> DNA
<213> Artificial Sequence

<220>
<223> Codon-Optimized HPV6 E2 fragment

<400> 105
ccacgagagc gtgctgctgt acaaggccaa gcagatgggc ctgagccaca tcggcatgca      60
ggtggtgcct cctctgaagg tgagcgaggc caaggg                                         96

<210> 106
<211> 103
<212> DNA
<213> Artificial Sequence

<220>
<223> Codon-Optimized HPV6 E2 fragment

<400> 106
gcagggtcca gggctccatg ctgtactcgg tgcgcagcag gctctcgagg tgcattctgca      60
tctcgatggc gttgtggccc ttggcctcgc tcaccttcag agg                               103

<210> 107
<211> 98
<212> DNA
<213> Artificial Sequence

<220>
<223> Codon-Optimized HPV6 E2 fragment

<400> 107
cgagtacagc atggagccct ggaccctgca ggagaccagc tacgagatgt ggcagacccc      60
tccaagcgc tgcttcaaga agcgcggcaa gaccgtgg                                         98

<210> 108
<211> 102

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<212> DNA
 <213> Artificial Sequence

 <220>
 <223> Codon-Optimized HPV6 E2 fragment

 <400> 108
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 cgtcgaactt cacctccacg gtcttgccgc gcttcttgaa gc 102

 <210> 109
 <211> 102
 <212> DNA
 <213> Artificial Sequence

 <220>
 <223> Codon-Optimized HPV6 E2 fragment

 <400> 109
 ccgacgtgta cgtgcaggac aacgacacct ggggtgaaggt gcacagcatg gtggacgcca 60
 agggcatcta ctacacctgt gccagttca agacctacta cg 102

 <210> 110
 <211> 92
 <212> DNA
 <213> Artificial Sequence

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 <223> Codon-Optimized HPV6 E2 fragment

 <400> 110
 gctgccgtag cacacctccc agtgcttggt gctgccgtac ttctcggcct ccttcacgaa 60
 gttcacgtag taggtcttga actggccaca gg 92

 <210> 111
 <211> 94
 <212> DNA
 <213> Artificial Sequence

 <220>
 <223> Codon-Optimized HPV6 E2 fragment

 <400> 111
 gcactgggag gtgtgctacg gcagcacctg gatctgcagc cccgctagcg tgagcagcac 60
 caccaggag gtgagcatcc ccgagagcac cacc 94

 <210> 112
 <211> 97
 <212> DNA
 <213> Artificial Sequence

 <220>
 <223> Codon-Optimized HPV6 E2 fragment

 <400> 112
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 ggcgggagtg tagtggtgc tctcggggat gctcacc 97

 <210> 113
 <211> 97
 <212> DNA
 <213> Artificial Sequence


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<220>
<223> Codon-Optimized HPV6 E2 fragment

<400> 113
ggacgccgtg cagacccctc ctgcaagcg cggccgcggc gtgcagcaga gcccctgcaa 60
cgccctgtgc gtggcccaca tcggccccgt ggacagc 97

<210> 114
<211> 94
<212> DNA
<213> Artificial Sequence

<220>
<223> Codon-Optimized HPV6 E2 fragment

<400> 114
ggcgctgctg ttgctgttgt tgcggcgctg gtgctggctg tggttgttgg tgatcagggt 60
gtggttgccg ctgtccacgg ggccgatgtg ggcc 94

<210> 115
<211> 95
<212> DNA
<213> Artificial Sequence

<220>
<223> Codon-Optimized HPV6 E2 fragment

<400> 115
ccgcaacaac agcaacagca ggcgcactcc catcgtgcag ttccagggcg agagcaactg 60
cctgaagtgc ttccgctacc gcctgaacga tcgcc 95

<210> 116
<211> 96
<212> DNA
<213> Artificial Sequence

<220>
<223> Codon-Optimized HPV6 E2 fragment

<400> 116
cgtgcttggtg gggagccttg ctgctggccc agtgccaggt gctgctgac aggtcgaaca 60
ggtggcggtg gcgatcgttc aggcggtagc ggaage 96

<210> 117
<211> 95
<212> DNA
<213> Artificial Sequence

<220>
<223> Codon-Optimized HPV6 E2 fragment

<400> 117
gcagcaaggc tccccacaag cagccatcg tgaccgtgac ctacgacagc gaggagcagc 60
gccagcagtt cctggacgtg gtgaagatcc ctccc 95

<210> 118
<211> 96
<212> DNA
<213> Artificial Sequence

<220>

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<223> Codon-Optimized HPV6 E2 fragment

<400> 118
ctcgagagat ctcccgggtc tagagcttac agcagggtgca ggctcatgaa gcccagcttg 60
tggctgatgg tgggagggat cttcaccacg tccagg 96

<210> 119

<211> 25

<212> DNA

<213> Artificial Sequence

<220>

<223> Codon-Optimized HPV6 E2 fragment

<400> 119
gaattcagat ctgatatcac catgg 25

<210> 120

<211> 21

<212> DNA

<213> Artificial Sequence

<220>

<223> Codon-Optimized HPV6 E2 fragment

<400> 120
gcagggtcca gggctccatg c 21

<210> 121

<211> 25

<212> DNA

<213> Artificial Sequence

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<223> Codon-Optimized HPV6 E2 fragment

<400> 121
cgagtacagc atggagccct ggacc 25

<210> 122

<211> 25

<212> DNA

<213> Artificial Sequence

<220>

<223> Codon-Optimized HPV6 E2 fragment

<400> 122
gctgccgtag cacacctccc agtgc 25

<210> 123

<211> 21

<212> DNA

<213> Artificial Sequence

<220>

<223> Codon-Optimized HPV6 E2 fragment

<400> 123
gcactgggag gtgtgctacg g 21

<210> 124

<211> 23
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<220>
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<400> 124
 ggcgctgctg ttgctgttgt tgc 23

<210> 125
 <211> 22
 <212> DNA
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<220>
 <223> Codon-Optimized HPV6 E2 fragment

<400> 125
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<210> 126
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 <212> DNA
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<400> 126
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<210> 127
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<400> 134
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<210> 135
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<210> 136
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<210> 143
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<400> 143
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<210> 144
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<400> 144
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<212> DNA
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 <400> 149
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<400> 150

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